

Beyond commercial interests lies an ecological responsibility: The dilemma of red-eared slider sales

Dawei Liu¹, Chunping Xie², Haixin Guan³, Senlin Hou¹, Xiaoming Xue¹

¹ Faculty of Criminal Science & Technology, Nanjing Police University, Nanjing 210023, China

² Tropical Biodiversity and Bioresource Utilization Laboratory, Qiongtai Normal University, Haikou 571127, China

³ Faculty of Public Security Department, Nanjing Police University, Nanjing 210023, China

Corresponding authors: Chunping Xie (xcp@mail.qtnu.edu.cn); Xiaoming Xue (xuexm@nfpc.edu.cn)

Abstract

The red-eared slider (*Trachemys scripta elegans*) is a globally recognized invasive alien species. First introduced to China in the 1980s, it is now distributed across all mainland provinces. Despite its designation as a prohibited invasive species, intentional releases remain common, largely due to its widespread availability and a critical lack of public awareness regarding its ecological impact. The commercial trade of this turtle is a key driver of this issue. Therefore, targeting the supply and sale of these animals is proposed as a critical intervention point. A tripartite management framework is recommended, encompassing institutional improvement, consumption guidance, and sales regulation.

Key words: Biological invasion, risk management, sales, *Trachemys scripta elegans*



Academic editor: Mark Auliya

Received: 3 November 2025

Accepted: 26 January 2026

Published: 6 February 2026

ZooBank: <https://zoobank.org/FB1112AF-45D4-4677-B803-AD54FFE557CB>

Citation: Liu D, Xie C, Guan H, Hou S, Xue X (2026) Beyond commercial interests lies an ecological responsibility: The dilemma of red-eared slider sales. Nature Conservation 61: 177–184. <https://doi.org/10.3897/natureconservation.61.176927>

Copyright: © Dawei Liu et al.

This is an open access article distributed under terms of the Creative Commons Attribution License (Attribution 4.0 International – CC BY 4.0).

The red-eared slider (*Trachemys scripta elegans*), native to the USA and adjacent Mexico, has become the most popular freshwater chelonian in the global pet trade (Burgin 2007). This species has undergone widespread human-mediated introduction globally and now maintains occupied ranges across every continent except Antarctica (Dupuis-Desormeaux et al. 2022). *Trachemys s. elegans* is characterized by a set of traits that includes broad physiological tolerance, phenotypic plasticity in response to novel conditions, and flexible behavioral strategies – all of which support the survival and reproduction of organisms across diverse environmental and climatic conditions (Leonetti et al. 2025). These characteristics constitute a major threat to both native turtle species and the entire local ecosystem. In addition to harming native species, they serve as carriers of zoonotic pathogens such as *Salmonella* spp., posing a potential threat to public health (Gong et al. 2018). This turtle is classified as one of the most iconic invasive taxa and is recognized as one of the world's 100 worst invasive alien species (Global Invasive Species Database 2025).

Red-eared sliders were introduced to China as ornamental pets beginning in the 1980s (Haitao et al. 2008). Their current distribution spans all provincial-level administrative regions in mainland China, including high-altitude areas such as Qinghai and Tibet (Deng et al. 2021; Zhong et al. 2024). The most concentrated populations are found in southeastern coastal provinces such as Guangdong, Zhejiang, and Jiangsu, exhibiting an overall spatial pattern characterized

by dense distribution in the southeast and sparse distribution in the northwest. They are commonly observed in water bodies adjacent to densely populated urban areas, scenic spots, and parks (Wang et al. 2011; Ge et al. 2018). Notably, their presence has also been documented in certain nature reserves, such as the Lhalu Wetland National Nature Reserve (Fan et al. 2016). In terms of natural aquatic systems, red-eared sliders are present in all major Chinese river basins, with particularly dense populations in the Pearl River Basin and the Yangtze River Basin (Gong et al. 2018).

In China, a complete industrial chain from large-scale breeding to market-oriented sales has been established around *Trachemys s. elegans*. On the supply side, hatchling production in Hainan Province reached nearly 3 million individuals in 2004; breeding volumes in provinces such as Hainan, Jiangsu, Zhejiang, Hunan, and Guangdong were estimated to reach 25 million in 2005, demonstrating sufficient breeding capacity to lay a solid foundation for market circulation (Xu et al. 2006). On the sales side, distribution has also been highly active (Fig. 1). In 2017, estimated sales of red-eared sliders on a single major e-commerce platform reached 3.36 million individuals (Liu et al. 2021). This turtle is also among the most commonly traded species in offline pet markets (Hu et al. 2023). A survey conducted between 2019 and 2020 revealed that a single stall in a pet market could sell over a thousand red-eared sliders annually (Deng et al. 2021). This pattern of massive supply and widespread distribution has transformed the slider from a formerly rare exotic species into an easily accessible commodity. Not only has this created a large population base conducive to dispersal into the wild, but it has also established a clear transmission mechanism: the greater the circulation volume, the higher the likelihood of individuals being released into natural environments – thereby proportionally escalating ecological risks (Kikillus et al. 2012).

Notably, *Trachemys s. elegans* was already included in the List of Alien Invasive Species in China in 2014 (Ministry of Ecology and Environment of the People's Republic of China 2014), with the illegal introduction, release, or discarding explicitly prohibited (Standing Committee of the National People's Congress of the People's Republic of China 2020). However, in reality, the release of unwanted turtles remains a frequent occurrence, constituting the primary pathway through which they enter natural environments (Iftime and Iftime 2022). This persistent issue stems from two main factors. Firstly, there is the material prerequisite of the species' widespread availability. More critically, however, there exists a severe lack of public awareness regarding its invasive nature. To boost sales, merchants often highlight the recreational value of the sliders while downplaying their invasive risks and omitting information about release prohibitions. Meanwhile, most consumers purchase them for purposes such as ritual release, as a companion animal, or for a pet-keeping experience. They are typically unaware of the invasive status or the potential harm caused by irresponsible release (Ma and Shi 2017).

Unlike ordinary commodities, the sale of red-eared sliders is not a neutral market transaction but a key driver of release and discarding risks. This amplification occurs through several channels: large-scale supply establishes a solid risk base; inadequate consumer awareness increases the likelihood of release; and these factors, combined with the species' inherent biological characteristics, collectively magnify the ecological threat (Fig. 2). Therefore, intervening at the point of sale represents the most critical leverage point for controlling in-

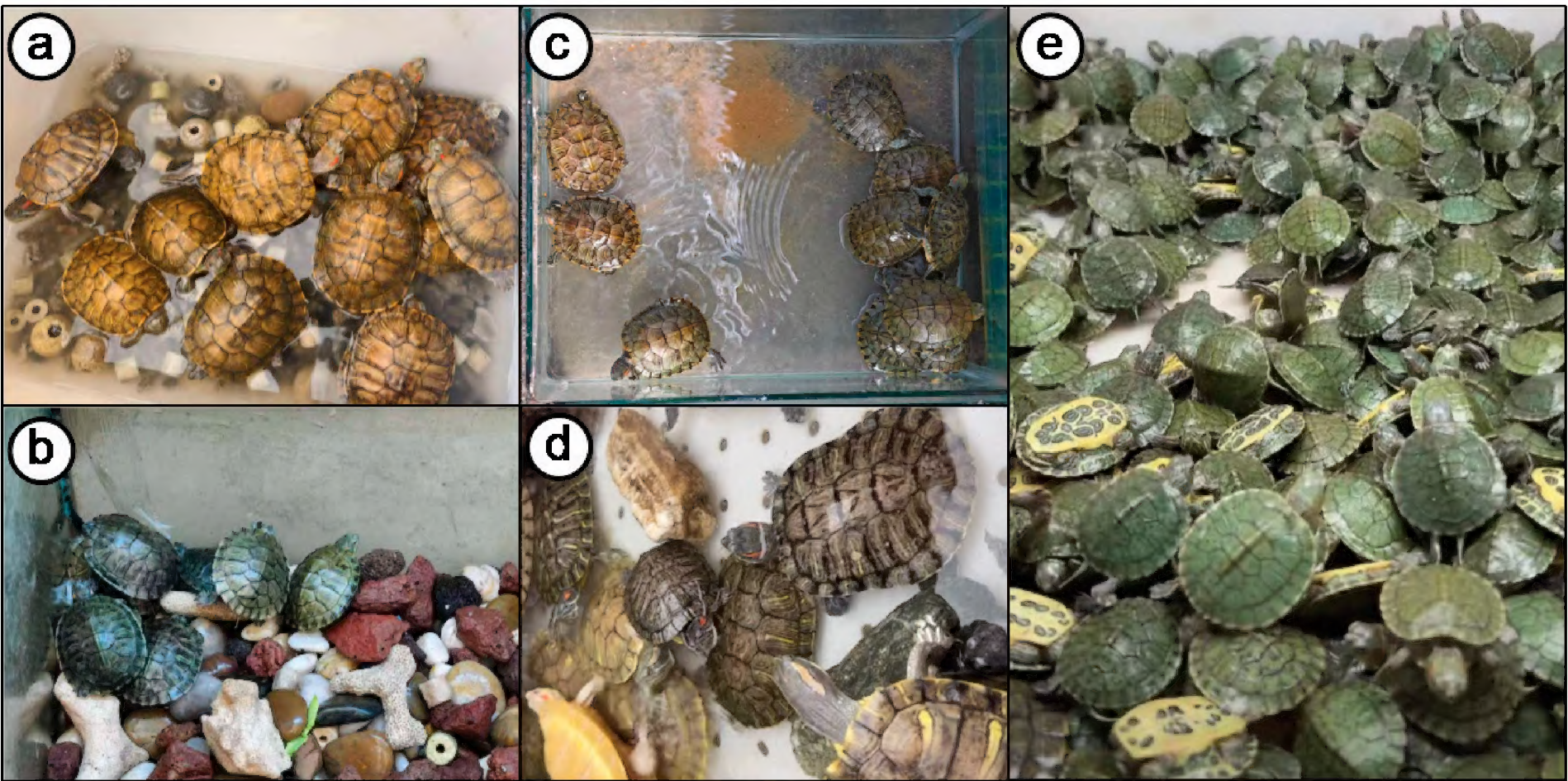


Figure 1. a–c. The red-eared sliders sold in the pet markets; d, e. The red-eared sliders sold on the e-commerce platforms.

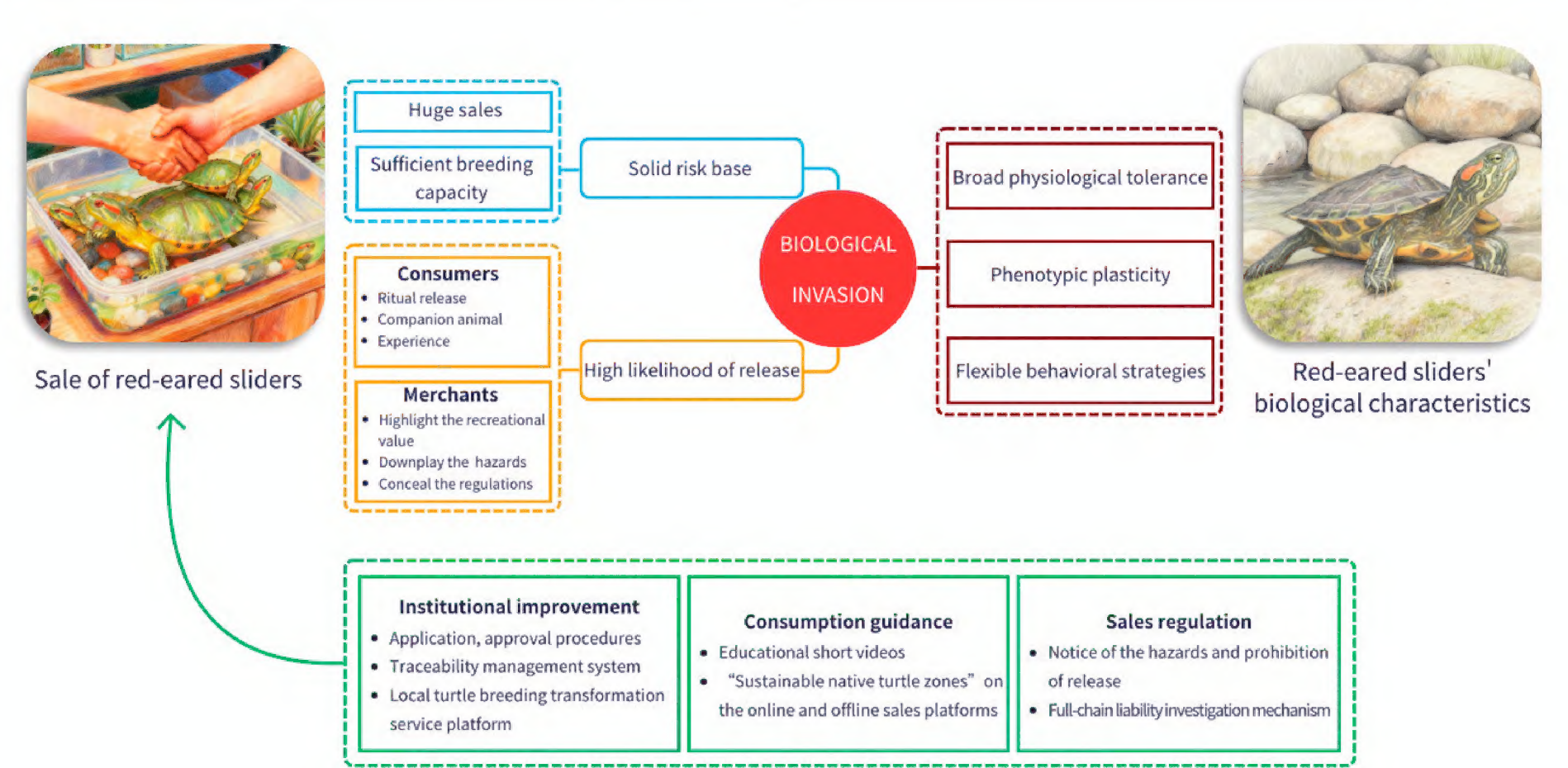


Figure 2. The framework and knowledge base of this study. Blue frames represent the risk foundation. Orange frames correspond to the key drivers. Maroon frames signify the inherent risks posed by the species' invasive biological traits. Green frames denote the proposed intervention pillars.

vasion risks and curbing their transmission. This intervention strategy rests on three core pillars: institutional improvement, consumption guidance, and sales regulation (Fig. 2), which together form a closed-loop management model targeting supply, demand, and the transaction itself.

The first pillar, institutional improvement, aims to establish a solid governance foundation and must be advanced on two complementary fronts. On the one hand, the focus should be on perfecting the legal framework: accelerating the development of supporting regulations, clarifying procedures for the breeding and sale of prohibited invasive species such as the red-eared slider, establishing specific

permitting and monitoring requirements for facilities that breed them, refining penalty standards, and fully implementing a system of full-chain licensing, unified labeling, and traceability to ensure verifiable, law-based supervision. On the other hand, proactive industry guidance is equally crucial. Effective management must also anticipate possible shifts in market behavior. Should regulatory measures succeed in reducing the supply of the red-eared slider, consumer demand may redirect toward other turtle species, including native taxa. A responsible and forward-looking strategy must incorporate guidance on potential legal alternatives, ensuring that new risks are not inadvertently generated by market displacement. Therefore, the government should take the lead in establishing a “Local Turtle Breeding Transformation Service Platform,” initially focusing on facilitating the transition away from red-eared slider production but with an expandable scope to include other high-risk invasive or threatened species as needed, to orchestrate a sector-wide transition. This involves partnering with research institutions to provide technical training, coordinating with financial institutions for transformation loans, connecting breeders with compliant sales channels, and offering subsidies. However, such guidance must be approached with extreme caution, as shifting market demand without ironclad safeguards could inadvertently incentivize the illegal harvesting and laundering of wild turtles, thereby exacerbating the conservation threats it seeks to mitigate. This caution is underscored by the severe conservation status of many native species (Stanford et al. 2020).

To preempt this risk and provide a clear, lawful avenue for any potential transition, the platform’s operations must be strictly anchored in the highest existing national standards. China’s policy framework offers a stringent and relevant precedent: the List of Artificial Breeding of National Key Protected Aquatic Wild Animals. This list defines the only conceivable legal pathway for market entry, mandating that a species simultaneously satisfy five rigorous criteria: (1) universally mature and standardized artificial breeding technology; (2) self-sustaining captive populations that do not require wild sourcing (except for specific genetic improvement); (3) breeding stock originating from the F3 generation or beyond, with at least two stable captive populations; (4) a demonstrated contribution to the conservation of wild populations—this should be a mandatory requirement, fulfilled through mechanisms such as allocating a portion of sales revenue to support critically endangered species such as the big-headed turtle (*Platysternon megacephalum*), whose captive breeding poses significant challenges (Gong et al. 2019); and (5) compliance with national laws and social ethics, with no adverse impacts on national image or international exchanges (Bureau of Fisheries and Fishery Administration, Ministry of Agriculture and Rural Affairs of the People’s Republic of China, 2017). The inclusion of eight turtle species (Ministry of Agriculture and Rural Affairs of the People’s Republic of China, 2017, 2019, 2021), such as *Mauremys reevesii* and *M. sinensis*, on this list demonstrates that a legal, traceable pathway is feasible for species that clearly and fully meet these rigorous benchmarks.

It must be unequivocally stressed, however, that the vast majority of native Chinese turtles do not meet these criteria. Therefore, the platform’s paramount and non-negotiable function is to enforce a fail-safe, full-chain traceability system. This system is the essential mechanism to guarantee that all market-bound individuals are from certified captive-bred stock, thereby eliminating the risk of laundering wild-caught turtles and ensuring that any future product claiming to be a “sustainable native alternative” is verifiable against these independently audited standards.

The second pillar, consumption guidance, seeks to dampen market demand by steering consumer preference toward ecologically sound alternatives. This pillar prioritizes the promotion of meaningful, non-organism alternatives for deeply held cultural practices such as ritual release. Positive, ecology-centered substitutions should be actively developed and promoted, including sponsoring or participating in the restoration of wildlife habitats and supporting the rehabilitation and, where scientifically justified, reintroduction of injured native wildlife through accredited conservation centers. Any reintroduction efforts must be predicated on the existence of suitable habitat, integrated with long-term monitoring, and accompanied by public awareness campaigns to ensure ecological and social viability. These alternatives align with the original compassionate intent of the tradition while directly contributing to ecological health, offering a transformative path that severs the link between cultural practice and ecological risk.

Alongside this primary focus, and only within the strictest boundaries defined under the institutional pillar, guidance may also address demand for living organisms. This requires a publicity system featuring “multi-party collaboration and online-offline integration,” led by wildlife authorities and synergizing efforts from turtle breeding associations, conservation groups, e-commerce platforms, and pet influencers. Initiatives should include producing short videos that not only compare ease of care but, more crucially, highlight the ecological damage of invasive species and the severe threats posed by the illegal turtle trade (e.g., genetic pollution, disease spread); creating “sustainable native turtle zones” in physical pet markets with illustrated educational boards that emphasize the conservation status of native species, the importance of purchasing only captive-bred individuals, and the species conservation ethics guidelines (requiring lifelong care, scientific husbandry, and regulatory cooperation) for keeping these species; and having e-commerce platforms launch “sustainable native turtle preferred” sections with traffic support, alongside intelligent prompts suggesting these legal alternatives when users browse red-eared sliders. To ensure the traceability and accountability of this entire approach, a system of individual turtle registration must be implemented. Each legally traded specimen shall be photographically registered to its buyer using its unique scute patterns and linked to a central registry. The sales agreement will legally bind the keeper to provide regular photo updates, creating a verifiable custody record. All guidance must explicitly state that the promoted “native alternative” refers exclusively to supporting well-managed, traceable captive-breeding operations that comply with the Wildlife Protection Law of the People’s Republic of China and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Consumer education should focus on responsible consumption, teaching buyers to identify legal sources and the imperative of “not purchasing wild-caught individuals, not engaging in illegal trade.” To ensure that buyers do not release their individual turtles, three measures are implemented: (1) signing a “no-release commitment letter” during purchase; (2) linking the buyer’s identity to the turtle’s registration information for traceability; and (3) imposing legal liabilities for intentional release in accordance with relevant regulations. The overarching goal is to reshape the market landscape by making responsible choices the more attractive and accessible option.

The third pillar, sales regulation, enforces stringent, closed-loop accountability across the entire sales process. Offline venues must display prominent

warnings categorizing the animal as an invasive alien species and detailing its hazards. E-commerce product pages must incorporate pop-up hazard reminders and conspicuously display slogans such as “Illegal Release Prohibited” in titles and images. Concurrently, a strengthened full-chain liability mechanism is essential: sellers failing in their duty of disclosure must bear joint liability for ecological damages with the releaser, while platforms that neglect their oversight duties must be held accountable for supervisory negligence. This creates a powerful deterrent and closes the loop on responsibility.

Addressing the red-eared slider challenge transcends mere species control, presenting an opportunity to re-evaluate the model of wildlife trade itself. By implementing the tripartite approach of institutional improvement, consumption guidance, and sales regulation, the immediate priority is to erect an impermeable barrier against further invasion and illegal trade. Success in this endeavor would not only mitigate an acute ecological threat but also foster the public awareness and regulatory rigor essential for any sustainable future interaction with wildlife.

Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

Use of AI

No use of AI was reported.

Funding

This research was funded by the National Key Research and Development Program of China (grant number 2022YFC2601200).

Author contributions

Dawei Liu conceived and designed the research; Haixin Guan and Senlin Hou performed the research; Dawei Liu and Chunping Xie wrote the original draft; and Xiaoming Xue reviewed and edited the manuscript. All authors read and agreed to the published version of the manuscript.

Author ORCIDs

Chunping Xie  <https://orcid.org/0000-0002-6228-7225>

Data availability

All of the data that support the findings of this study are available in the main text.

References

Bureau of Fisheries and Fishery Administration Ministry of Agriculture and Rural Affairs, People's Republic of China (2017) Announcement on soliciting public opinions on the list of artificial breeding of national key protected aquatic wild animals (the first batch). https://yj.moa.gov.cn/tzgg/201709/t20170929_6300739.htm [Accessed on 11 January 2026]

- Burgin S (2007) Status report on *Trachemys scripta elegans*: pet terrapin or Australia's pest turtle? In: Lunney D, Dickman C, Burgin S (Eds) *Pest or Guest: The Zoology of Overabundance*. Royal Zoological Society of New South Wales, Mosman, 1–7. <https://doi.org/10.7882/FS.2007.003>
- Deng T, Li Y, Zhang J, Li W, Xu C, Li Y (2021) New record of the invasive red-eared slider *Trachemys scripta elegans* (Wied, 1838) on the Qinghai-Tibetan Plateau, China. *Bio-Invasions Records* 10: 969–976. <https://doi.org/10.3391/bir.2021.10.4.21>
- Dupuis-Desormeaux M, Lovich JE, Whitfield Gibbons J (2022) Re-evaluating invasive species in degraded ecosystems: A case study of red-eared slider turtles as partial ecological analogs. *Discover Sustainability* 3: 15. <https://doi.org/10.1007/s43621-022-00083-w>
- Fan L, Tu Y, Li J, Li J, Xie Y (2016) The Red-eared Slider (*Trachemys scripta elegans*) Found at Lhalu Wetland National Nature Reserve, Tibet, China. *Dongwuxue Zazhi* 51: 1100.
- Ge Y, Wei Y, Chek S, Gong S (2018) Diversity and Conservation of Amphibians and Reptiles in Macau, China. *Yesheng Dongwu* 39: 639–645.
- Global Invasive Species Database (2025) Species profile: *Trachemys scripta elegans*. <http://www.iucngisd.org/gisd/species.php?sc=71> [Accessed on 25 October 2025]
- Gong S, Yang J, Ge Y, Gaillard D (2018) Extent and Mechanisms of the Increasing Geographic Distribution of the Alien Red-Eared Slider (*Trachemys scripta elegans*) in China. *Yesheng Dongwu* 39: 373–378.
- Gong S, Hua L, Ge Y, Cao D (2019) Unique multiple paternity in the endangered big-headed turtle (*Platysternon megacephalum*) in an ex situ population in South China. *Ecology and Evolution* 9: 9869–9877. <https://doi.org/10.1002/ece3.5528>
- Haitao S, Parham JF, Zhiyong F, Meiling H, Feng Y (2008) Evidence for the massive scale of turtle farming in China. *Oryx* 42: 147–150. <https://doi.org/10.1017/S0030605308000562>
- Hu S, Yang J, Shi H (2023) Investigation and Research on Chelonians Trade Status of Guangzhou in Recent Ten Years. *Dongwuxue Zazhi* 58: 94–107. <https://doi.org/10.13859/j.cjz.202301009>
- Iftime O, Iftime A (2022) Variability and hybridisation in the introduced pond slider turtle *Trachemys scripta* in Romania. *Herpetological Bulletin* 161: 20–23. <https://doi.org/10.33256/hb161.2023>
- Kikillus KH, Hare KM, Hartley S (2012) Online trading tools as a method of estimating propagule pressure via the pet-release pathway. *Biological Invasions* 14: 2657–266. <https://doi.org/10.1007/s10530-012-0262-5>
- Leonetti FL, Crescente A, Valerioti C, Paolillo G, Giglio G, Bernabò I, Tripepi S, Sperone E (2025) How microhabitat characteristics influence the females' nest site selection of the invasive alien species *Trachemys scripta* in the Angitola Lake (Calabria, Southern Italy). *The European Zoological Journal* 92: 695–708. <https://doi.org/10.1080/24750263.2025.2516658>
- Liu S, Newman C, Buesching CD, Macdonald DW, Zhang Y, Zhang K-J, Li F, Zhou Z-M (2021) E-commerce promotes trade in invasive turtles in China. *Oryx* 55: 352–355. <https://doi.org/10.1017/S0030605319001030>
- Ma K, Shi H (2017) Red-Eared Slider *Trachemys scripta elegans* (Wied-Neuwied). In: Wan F, Jiang M, Zhan A (Eds) *Biological Invasions and Its Management in China: Volume 2*. Springer Singapore, Singapore, 49–76. https://doi.org/10.1007/978-981-10-3427-5_4
- Ministry of Agriculture and Rural Affairs People's Republic of China (2017) The List of Artificial Breeding of National Key Protected Aquatic Wild Animals (the first batch).

- https://www.moa.gov.cn/nybgb/2017/201712/201802/t20180202_6136346.htm [Accessed on 11 January 2026]
- Ministry of Agriculture and Rural Affairs People's Republic of China (2019) The List of Artificial Breeding of National Key Protected Aquatic Wild Animals (the second batch). https://www.moa.gov.cn/govpublic/YYJ/201908/t20190802_6322028.htm [Accessed on 11 January 2026]
- Ministry of Agriculture and Rural Affairs People's Republic of China (2021) The List of Artificial Breeding of National Key Protected Aquatic Wild Animals (the third batch). https://www.moa.gov.cn/govpublic/YYJ/202112/t20211206_6383853.htm [Accessed on 11 January 2026]
- Ministry of Ecology and Environment of the People's Republic of China (2014) The list of alien invasive species in China (the third batch). https://www.mee.gov.cn/gkml/hbb/bgg/201408/t20140828_288367.htm [Accessed on 25 October 2025]
- Standing Committee of the National People's Congress of the People's Republic of China (2020) Biosecurity Law of the People's Republic of China. http://www.npc.gov.cn/npc/c2/c30834/202010/t20201017_308282.html [Accessed on 25 October 2025]
- Stanford CB, Iverson JB, Rhodin AGJ, Paul van Dijk P, Mittermeier RA, Kuchling G, Berry KH, Bertolero A, Bjorndal KA, Blanck TEG, Buhlmann KA, Burke RL, Congdon JD, Diagne T, Edwards T, Eiseberg CC, Ennen JR, Forero-Medina G, Frankel M, Fritz U, Gallego-García N, Georges A, Gibbons JW, Gong S, Goode EV, Shi HT, Hoang H, Hofmeyr MD, Horne BD, Hudson R, Juvik JO, Kiester RA, Koval P, Le M, Lindeman PV, Lovich JE, Luiselli L, McCormack TEM, Meyer GA, Páez VP, Platt K, Platt SG, Pritchard PCH, Quinn HR, Roosenburg WM, Seminoff JA, Shaffer HB, Spencer R, Van Dyke JU, Vogt RC, Walde AD (2020) Turtles and Tortoises Are in Trouble. *Current Biology*: CB 30: R721–R735. <https://doi.org/10.1016/j.cub.2020.04.088>
- Wang L, Hong M, Yuan X, Pei E, Liu Z, Wang Z (2011) Survey on the Diversity of Amphibians and Reptiles in the Main Parks in the Urban District of Shanghai. *Sichuan Journal of Zoology (London, England)* 30: 69–73. <https://doi.org/10.1101/2020.02.04.933598>
- Xu J, Zhou T, Ye C, Huang C (2006) Analysis on Possibility of Terrapin Invasion and Its Countermeasures. *Sichuan Journal of Zoology* 25: 420–422. <https://doi.org/10.1080/24750263.2025.2516658>
- Zhong J, Gong S-B, Guo K, Ji X (2024) The risk of biological invasion by red-eared slider turtles (*Trachemys scripta elegans*) in China inferred from niche shifting. *Ecological Indicators* 166: 112296. <https://doi.org/10.1016/j.ecolind.2024.112296>